

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BOARD OF PATENT APPEALS
AND INTERFERENCES

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARCUS R. SKEEM,
SERGEJ-TOMISLAV BULJAN
and JEAN KRAMP

Appeal No. 2000-0207
Application No. 08/892,836

ON BRIEF

Before ABRAMS, FRANKFORT, and STAAB, Administrative Patent Judges.
STAAB, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the examiner's final rejection of claims 1, 3-26 and 28-34. Claims 2 and 27, the only other claims pending in the application, have been withdrawn from consideration pursuant to 37 CFR 1.142(b) as not reading on the elected species.

Appellants' invention pertains to an cutting tool (claims 1-12 and 28-34) comprising a layer of abrasive grains chemically bonded to a substrate, the substrate having a plurality of contoured teeth extending from the substrate surface. Appellants' invention also

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pertains to a method of cutting (claims 13-26) using a cutting tool having a layer of abrasive grains chemically bonded to the substrate of the tool. A substantially correct copy of the appealed claims can be found in Appendix annexed to the main brief.¹

The references relied upon in the final rejection are:

Lowder et al. (Lowder)	3,894,673	July 15, 1975
Asada	5,018,276	May 28, 1991
Scott	5,215,072	Jun. 1, 1993

Claims 1, 3-26 and 28-34 stand rejected under 35 U.S.C. § 103 as being unpatentable over Asada in view of Lowder and Scott.

Reference is made to appellants' brief (Paper No. 32) and to the examiner's answer (Paper No. 33) for the respective positions of appellants and the examiner regarding the merits of this rejection.

Opinion

We have given careful consideration to the specification and claims, the prior art references applied by the examiner, the

¹In claim 28, the first two lines of paragraph c) should read: "c) a first uppermost cutting level comprising superabrasive grains and successive uppermost cutting levels among the plurality of cutting levels of each tooth;".

evidence of nonobviousness submitted by appellants², and the above noted arguments of appellants and the examiner. As a result, we make the determinations that follow.

Preliminary matters

At the outset, we note that appellants' brief (page 4-6) includes a "Grouping of Claims" section which indicates on page 4 that "[a]ppellants consider each claim herein to be separately patentable." There follows on pages 4-6 statements that paraphrase the limitations of many of the appealed claims. Merely pointing out limitations of the claims that may serve to distinguish the claims from each other, without specifically pointing out how those limitations patentably distinguish over the applied prior art, does not constitute a separate argument in favor of patentability. Accordingly, we focus on the arguments actually made in the brief that appellants have urged as distinguishing over the prior art and decide the appeal based on the success or failure of these arguments. See *In re Hellsund*, 474 F.2d 1307, 1309-10, 177 USPQ 170, 172 (CCPA 1973).

²Appellants' evidence of nonobviousness comprises the declarations under 37 CFR 1.132 of Sergej-Tomislav Buljan executed May 29, 1997 (Buljan I) and November 25, 1998 (Buljan II).

The applied references

Asada, the examiner's primary reference, comprises an abrasive cutting tool 6 comprising a substrate having a substrate surface with a plurality of teeth 7, and a layer comprising ultra-hard abrasive grains bonded to the teeth by electroforming (column 3, lines 30-3). Figure 5 of Asada illustrates an intermediate product in the formation of Asada's invention wherein abrasive grains 8 and 8a have been deposited on the peripheral surfaces 7 and tops 7a, respectively, of the teeth. In order to obtain the uniform wear characteristic shown in Figure 11 that Asada deems desirable, the grains 8a bonded to the tops 7a of the teeth are removed by a grinding tool 10. The resulting tool is illustrated in Figures 6 and 7 and comprises Asada's invention. The manner in which Asada's tool operates in cutting a workpiece is explained at column 3, line 46, through column 4, line 9, as follows:

In cutting a work, the top surface 7a of each of the teeth 7 and the abrasive grains 8b, which are the part of the ultra-hard abrasive grains 8 bonded to the peripheral portion of the surface 7a contact with the work to be cut. In this stage, abrasive areas 8b mainly cut the work while the top surface 7a is worn by its contact with the work. The wear rate of the top surface 7a substantially corresponds to that of the abrasive grains 8b.

After the part 8b is worn out, the abrasive grains 8c, which are the part of the ultra hard-abrasive grains

8 which are positioned on the base side of each tooth 7 subsequent to abrasive grains 8b, contact with the work so as to cut it, and further subsequent ultra-hard abrasive grains contact with the work and cut it in the same manner. [Emphasis added.]

Lowder is directed to a method of manufacturing an abrasive tool comprising a monolayer of diamond crystals. Lowder's method is characterized by a direct brazing technique for bonding the diamond crystals to a substrate surface. As set forth in the abstract, the result is a final product having outstanding retention of the diamond crystals and greatly extended tool life. According to Lowder, the inventive abrasive tool has a useful life up to six times greater than electroplated tools under the same conditions (column 6, lines 44-54).

Scott pertains to a saw chain for cutting aggregate material, and the cutting elements thereof. The cutting elements may be attached to links such as links 25 and 26 seen in Figures 2 and 3. As illustrated in Figures 3 and 4, each cutting element comprises an abrading element formed by select placement of hard, wear resistant particles **34**, diamonds in the preferred embodiment, organized as rows of particles **34a**, **34b**, **34c**, **34d**, and **34e** in the openings of a wire mesh **35**. The particles **34** are partially held in the openings of the wire mesh **35** by being at least partially embedded in a bonding agent **46**, such as sintered metal powers. [Column 4, lines 50-57; emphasis added.]

As best seen in Figures 4, 5 and 8, the surface to which the wear resistant particles are attached is inclined at an angle relative to the travel path 50 of the chain and with respect to the material to be cut, such that each cutting element presents its trailing, or topmost, edge to the material to be cut. The cutting action resulting from inclined orientation of the cutting elements is described in detail at column 5, line 18-50. Some of the advantages of cutting with the trailing, or topmost, edges of the cutting elements are set forth at column 5, line 55, through column 6, line 2. Scott states at column 8, lines 16-18, that cutting elements with their inclined mesh cutting surfaces also may be applied to a circular saw.

Claims 1, 5-9, 11-13, 17-26 and 30-33

As correctly pointed out by appellants on page 11 of the brief, claims 1, 5-9, 11-13, 17-26 and 30-33 are similar in the sense that they do not include the so-called negative rake angle limitation argued by appellants as a separate basis for patentability. In that these claims have been argued as a group by appellants in the brief, we select claim 1 as representative thereof.

Claim 1 is directed to an abrasive cutting tool comprising a substrate having a substrate surface with a plurality of teeth, and

a layer comprising superabrasive grains chemically bonded to at least a portion of each tooth to define a plurality of cutting levels, with the cutting levels being oriented such that a portion of each cutting level overlaps at least a portion of each other cutting level. Claim 1 further states that the cutting levels comprise a first uppermost cutting level comprising superabrasive grains and successive uppermost cutting levels, whereby

after the first uppermost cutting level has been worn away by cutting a workpiece, each successive uppermost cutting level of the tooth presents to the workpiece a *ring of superabrasive grain around the contoured surface of the tooth*, and substantially all superabrasive grain within the ring simultaneously engages in cutting.^[3]
[Emphasis added.]

In rejecting this claim, the examiner determined that Asada discloses the claimed invention with the exception of (1) the abrasive layer being chemically bonded to the surfaces of the teeth, and (2) the cutting surface having a negative angle of inclination with respect to the intended direction of movement. However, the examiner has taken the position that it would have been obvious to one of ordinary skill in the art to utilize the

³An arrangement of grains that is covered by this claim language is illustrated in Figures 4A-4D and Figures 5A-5D where, in Figures 4A and 5A, a first uppermost cutting level comprising a line of abrasive grains is illustrated, and, in Figures 4B and 5B through Figures 4D and 5D, successive uppermost cutting levels comprising rings of abrasive grains are illustrated.

method taught by Lowder to chemically bond the abrasive grains of Asada to the substrate surface to provide a very strong securement of the grains to the teeth, and that it also would have been obvious to provide the abrasive tool of Asada with cutting elements having a cutting surface with a negative angle of inclination in view of Scott.⁴

We are in agreement with the examiner that it would have been obvious to use the method taught by Lowder to bond the abrasive grains of Asada to the substrate surface to gain the benefit of the very strong securement of the grains to the teeth and the attendant increase in tool life taught by Lowder. Concerning the requirement of claim 1 that the layer of superabrasive grains is "chemically bonded" to the teeth, while Lowder does not expressly use this terminology in describing the bond that results from the brazing technique disclosed therein, appellants do not argue this as a difference and thus it will be assumed that the limitation is met by Lowder's braze. Cf. *In re Baxter Travenol Labs*, 952 F.2d 388, 391, 21 USPQ2d 1281, 1285 (Fed. Cir. 1991) ("It is not the function of this court to examine the claims in greater detail than argued

⁴In that appealed claim 1 does not require cutting elements having cutting surfaces with a negative angle of inclination, the Scott reference is mere surplusage in the rejection of claim 1.

by an appellant, looking for nonobvious distinctions over the prior art."); *In re Wiseman*, 596 F.2d 1019, 1022, 201 USPQ 658, 661 (CCPA 1979) (arguments must first be presented to the Board).

Appellants' arguments have been considered but are not persuasive that the examiner erred in rejecting claim 1. Some of these arguments, such as the one directed to the negative rake angle of the teeth, fail at the outset because they are predicated on limitations that do not appear in claim 1. See, for example, *In re Self*, 671 F.2d 1344, 1348, 213 USPQ 1, 5 (CCPA 1982). Other arguments merely point out the individual deficiencies of the references. However, nonobviousness cannot be established by attacking the references individually where, as here, the rejection is based on a combination of references. *In re Merck & Co. Inc.*, 800 F.2d 1091, 1097, 231 USPQ 375, 380 (Fed. Cir. 1986). As to appellants' argument to the effect that the collective teachings of the applied references do not teach or suggest a first uppermost cutting level of grains, we observe that in Asada, the first uppermost cutting level comprises the grains 8b bonded to the peripheral portion of the top surface 7a, which grains clearly serve as the uppermost grains that first engage and cut the work (column 3, lines 46-53). In this regard, appellants' claims do not

preclude the first uppermost cutting level from being a ring of abrasive grains.

In light of the above, we conclude, as did the examiner, that the applied prior art is sufficient to establish a *prima facie* case of obviousness of claim 1. In that claims 5-9, 11-13, 17-26 and 30-33 have not been argued with any reasonable degree of specificity apart from claim 1, we conclude that the applied prior art is sufficient to establish a *prima facie* case of obviousness of these claims as well.

Having arrived at a conclusion that the teachings of the prior art are sufficient to establish a *prima facie* case of obviousness for the reasons set forth above, we turn to the evidence of nonobviousness in the form of the Buljan declarations submitted by appellants, bearing in mind the necessity of reweighing the entire merits of the matter and hence of considering all the evidence of record anew. *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

The Buljan I declaration appears to have been submitted to establish that abrasive tools that have abrasive grains chemically bonded to the substrate exhibit unexpectedly superior performance relative to tools such as those of Asada and Scott that do not have abrasive grains chemically bonded to the substrate.

Just as unexpected results are evidence of nonobviousness, expected results are evidence of obviousness. *In re Skoll*, 523 F.2d 1392, 1397, 187 USPQ 481, 484 (CCPA 1975); *In re Juillard*, 476 F.2d 1380, 1382, 177 USPQ 570, 571 (CCPA 1973); *In re Gershon*, 372 F.2d 535, 537, 152 USPQ 602, 604 (CCPA 1967). In the present case, the Lowder reference establishes that it would be expected that abrasive tools that have abrasive grains chemically bonded to the substrate would exhibit superior performance relative to abrasive tools that do not. Accordingly, the Buljan I declaration does not establish any unexpected result relative to the use of chemical bonding techniques to bond the abrasive grains to the substrate.

The Buljan II declaration is similar to Buljan I in that it is presented, at least in part, to establish that abrasive tools having abrasive grains chemically bonded to the substrate exhibit unexpectedly superior performance relative to abrasive tools that do not. For the reasons stated above, the evidence is not persuasive that chemical bonding produces an unexpected result. Buljan II is also relied upon to establish that abrasive tools that utilize the combination of (1) chemically bonded abrasive grains, (2) negative rake angle design, and (3) grains of cutting levels distributed as a ring of grains, exhibit superior performance relative to tools that utilize (1) but lack (2) and (3). However,

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in that claim 1 does not require the teeth to have a negative rake angle design, a proper nexus between the evidence of nonobviousness and the invention of claim 1 has not been established. Under these circumstances, the evidence of nonobviousness can be accorded relatively little weight. See, for example, *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed. Cir. 1984), cert. denied, 471 U.S. 1065 (1985), and *Stratoflex Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539, 218 USPQ 871, 879 (Fed. Cir. 1983).

Thus, when the question of obviousness/nonobviousness is considered anew, appellants' evidence of nonobviousness does not outweigh the examiner's evidence of obviousness, namely the Asada, Lowder and Scott references applied against the claims. Therefore, we shall sustain the rejection of claims 1, 5-9, 11-13, 17-26 and 30-33 under 35 U.S.C. § 103.

Claims 3, 4, 10, 14-16, 28, 29 and 34

Claims 3, 4, 10, 14-16, 28, 29 and 34 all include the negative rake angle limitation that has been separately argued by appellants.

Looking first at claim 3, this claim depends from claim 1 and adds that at least a portion of each tooth has a face which is

inclined at a negative angle with respect to the intended direction of rotation of movement. Thus, the tool of claim 3 includes the chemical bonding limitation and the cutting levels having grains distributed as a ring of grains limitation set forth in claim 1, as well as the negative rake angle limitation of claim 3.

While we certainly appreciate that the Scott reference relied upon by the examiner teaches the negative rake angle design asserted by appellants as patentably distinguishing over the applied references, as well as several advantages resulting from this design, it is not apparent to us, and the examiner has not persuasively explained, how the combined teachings of the references would result in an abrasive tool that has both the negative rake angle configuration and cutting levels having grains distributed as rings of grains, as required by claims 1 and 3. In this regard, we note that the grains in the various cutting levels of Scott are distributed as rows. See column 5, lines 37-44, and Figure 4 of Scott. Accordingly, it appears to us that one of ordinary skill in the art would most likely combine the negative rake angle design of Scott with Asada in a manner that would result in an abrasive tool similar to the "Sample 278" tool of the Buljan II declaration, wherein the various cutting levels have their grains distributed in rows in accordance with Scott's teaching.

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This arrangement, of course, would not result in the claimed subject matter.

Where prior art references require a selective combination of reference features to render obvious a claimed invention, there must be some reason for the combination other than hindsight gleaned from the invention disclosure, *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985). In the fact situation before us, we are unable to agree with the examiner's implicit position to the effect that one of ordinary skill in the art would have been motivated by the combined teachings of Asada and Scott to incorporate the negative rake angle feature of Scott in the abrasive tool of Asada in a manner that would result in the abrasive grains being arranged in the cutting levels in rings.

In light of the above, we conclude that a *prima facie* case of obviousness of claim 3, as well as claim 4 that depends therefrom, has not been established. Accordingly, we shall not sustain the rejection thereof under 35 U.S.C. § 103. Since claims 10, 28, 29 and 34 contain limitations similar to those of claim 3, we also shall not sustain the 35 U.S.C. § 103 rejection of these claims.

We reach an opposite conclusion with respect to claims 14, 15 and 16. Representative claim 15 depends from method claim 13 and

adds that the abrasive tool used in the practice of the cutting method of claim 13 includes at least a portion of each tooth having a face which is inclined at a negative angle. However, neither claim 15 nor base claim 13 from which claim 15 depends requires that any of the cutting levels to have grains distributed as rings of grains. Accordingly, our reasoning above for concluding that the reference evidence adduced by the examiner was not sufficient to establish a *prima facie* case of obviousness does not apply here. As we see it, Scott's explanation at column 5, line 55, through column 6, line 2, of the advantages of providing a negative rake angle design comprising cutting level wherein the grains are arranged in rows provides ample motivation for incorporating this tooth design in the abrasive tool of Asada. This view is bolstered by Scott's teaching at column 8, lines 16-18, that the inclined tooth design may be applied to a circular saw. Accordingly, we consider that the reference evidence adduced by the examiner is sufficient to establish a *prima facie* of claim 15, as well as claims 14 and 16 that also depend from claim 13 and that have not been separately argued.

Considering anew the issue of obviousness under 35 U.S.C. § 103 with respect to claims 14-16, the Buljan I declaration is entitled to relatively little weight for the reasons discussion

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above. As to the Buljan II declaration, while the test data thereof supports the conclusion that an abrasive tool having negative rake angle *and* cutting levels having grains distributed as rings of grains (i.e., "Sample 277") outperforms an abrasive tool having negative rake angle without cutting levels having grains distributed as rings of grains (i.e., "Sample 278"), this conclusion is entitled to relatively little weight with respect to claims 14-16 because they do not require a negative rake angle *and* cutting levels having grains distributed as rings of grains. Thus, a proper nexus between the test data of Buljan II and claims 14-16 has not been established.

For this reason, when the question of obviousness is considered anew, appellants' evidence of nonobviousness does not outweigh the examiner's evidence of obviousness, namely the Asada, Lowder and Scott references applied against the claims. Therefore, we shall sustain the rejection of claims 14-16 under 35 U.S.C. § 103.

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Summary

The rejection of claims 1, 3-26 and 28-34 is affirmed with respect to claims 1, 5-9, 11-26 and 30-33, but is reversed with respect to claims 3, 4, 10, 28, 29 and 34.

The decision of the examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART



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Administrative Patent Judge)
)
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CHARLES E. FRANKFORT)
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